

FORM PTO-1390
(REV. 11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

0040-0151P

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

10/069887

INTERNATIONAL APPLICATION NO.

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

PCT/FR00/02410

August 31, 2000

September 3, 1999

TITLE OF INVENTION

ALTERNATING-CURRENT ELECTRIC MOTOR

APPLICANT(S) FOR DO/EO/US

PROUVOST, Hubert

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau. WO 01/18942
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☒ is transmitted herewith.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98, Form PTO-1449(s), and International Search Report (PCT/ISA/210) with 0 cited document(s).
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☒ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
 - 1.) PCT Substitute Claims Letter w/ PCT/IPEA/409 and amended sheets
 - 2.) Four (4) sheets of Formal Drawings

U.S. APPLICATION NO. (if known, see 37 CFR 1.53) 10069887		INTERNATIONAL APPLICATION NO. PCT/FR00/02410		ATTORNEYS DOCKET NUMBER 0040-0151P	
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<p>21. <input checked="" type="checkbox"/> The following fees are submitted:</p> <p>BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. \$1,040.00</p> <p>International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO. \$890.00</p> <p>International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. \$740.00</p> <p>International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00</p> <p>International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00</p> <p>ENTER APPROPRIATE BASIC FEE AMOUNT =</p> <p>Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)). \$ 130.00</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%;">CLAIMS</th> <th style="width: 20%;">NUMBER FILED</th> <th style="width: 20%;">NUMBER EXTRA</th> <th style="width: 20%;">RATE</th> <th style="width: 20%;"></th> </tr> <tr> <td>Total Claims</td> <td>8 - 20 =</td> <td>0</td> <td>X \$18.00</td> <td>\$ 0</td> </tr> <tr> <td>Independent Claims</td> <td>1 - 3 =</td> <td>0</td> <td>X \$84.00</td> <td>\$ 0</td> </tr> <tr> <td colspan="3">MULTIPLE DEPENDENT CLAIM(S) (if applicable) None</td> <td>+ \$280.00</td> <td>\$ 0</td> </tr> <tr> <td colspan="4">TOTAL OF ABOVE CALCULATIONS =</td> <td>\$ 1020.00</td> </tr> </table> <p><input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.</p> <p style="text-align: right;">SUBTOTAL = \$ 1020.00</p> <p>Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)). \$ 0</p> <p style="text-align: right;">TOTAL NATIONAL FEE = \$ 1020.00</p> <p>Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property + \$ 0</p> <p style="text-align: right;">TOTAL FEES ENCLOSED = \$ 1020.00</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;"></td> <td style="width: 20%; text-align: right;">Amount to be:</td> </tr> <tr> <td></td> <td style="text-align: right;">refunded</td> </tr> <tr> <td></td> <td style="text-align: right;">charged</td> </tr> </table>	CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		Total Claims	8 - 20 =	0	X \$18.00	\$ 0	Independent Claims	1 - 3 =	0	X \$84.00	\$ 0	MULTIPLE DEPENDENT CLAIM(S) (if applicable) None			+ \$280.00	\$ 0	TOTAL OF ABOVE CALCULATIONS =				\$ 1020.00		Amount to be:		refunded		charged	<p>CALCULATIONS</p> <p>PTO USE ONLY</p>
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Total Claims	8 - 20 =	0	X \$18.00	\$ 0																												
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a. ☒ A check in the amount of \$ **1020.00** to cover the above fees is enclosed.

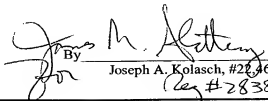
b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees.
 A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:
 Birch, Stewart, Kolasch & Birch, LLP or Customer No. 2292
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Date: March 1, 2002

By 

Joseph A. Kolasch, #22463
 (leg # 28380)

PATENT
0040-0151P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: PROUVOST, Hubert
Int'l. Appl. No.: PCT/FR00/02410
Appl. No.: New Group:
Filed: March 1, 2002 Examiner:
For: ALTERNATING-CURRENT ELECTRIC MOTOR

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, DC 20231

March 1, 2002

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/FR00/02410 which has an International filing date of August 31, 2000, which designated the United States of America.--

IN THE CLAIMS:

Please amend the claims as follows:

3. (Amended) The motor as claimed in claim 1, characterized in that the leaktight wall of the stator chamber (20) includes a device (40) for compensating for the pressure difference between the inside and the outside of the said chamber.

4. (Amended) The motor as claimed in claim 1, characterized in that the stator electrical windings (7,8) include at least one connection (38) for drawing electrical energy.

5. (Amended) The motor as claimed in claim 1, characterized in that the stator magnetic circuit includes a supplementary electrical winding for drawing electrical energy.

6. (Amended) The motor as claimed in claim 1, characterized in that it further includes an inlet tapping (23) and an outlet tapping (24) which are mounted on the wall of the stator chamber (20) for connecting an external device for cooling a fluid filling the stator chamber (20).

7. (Amended) The motor as claimed in claim 1, characterized in that it further includes a jacket (43) produced from a non-magnetic insulating material which encases the first part (2) of

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the stator magnetic circuit, connected in leaktight fashion to the part (22) produced from non-magnetic insulating material of the wall of the chamber (20) in order to render the said chamber leaktight.

8. (Amended) The motor as claimed in claim 1, characterized in that the bearing (16 and 17), which support the rotational shaft (15) of the rotor (14), are linked mechanically to the second part (10) of the stator magnetic circuit by fixing pieces (41 and 42) made of a non-magnetic and insulating material.

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REMARKS

The specification has been amended to provide a cross-reference to the previously filed International Application.

The claims have been amended to delete multiple dependencies and to place the application into better form for examination. Entry of the above amendments is earnestly solicited. An early and favorable first action on the merits is earnestly solicited.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By 
for Joseph A. Kolasch, #226463
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JAK/cqc
0040-0151P

Attachment: VERSION WITH MARKINGS TO SHOW CHANGES MADE

(Rev. 02/21/02)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

The claims have been amended as follows:

3. (Amended) The motor as claimed in claim 1[or 2], characterized in that the leaktight wall of the stator chamber (20) includes a device (40) for compensating for the pressure difference between the inside and the outside of the said chamber.

4. (Amended) The motor as claimed in [any one of claims 1 to 3]claim 1, characterized in that the stator electrical windings (7,8) include at least one connection (38) for drawing electrical energy.

5. (Amended) The motor as claimed in [any one of claims 1 to 4]claim 1, characterized in that the stator magnetic circuit includes a supplementary electrical winding for drawing electrical energy.

6. (Amended) The motor as claimed in [any one of claims 1 to 5]claim 1, characterized in that it further includes an inlet tapping (23) and an outlet tapping (24) which are mounted on the wall of the stator chamber (20) for connecting an external device for cooling a fluid filling the stator chamber (20).

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7. (Amended) The motor as claimed in [any one of claims 1 to 6]claim 1, characterized in that it further includes a jacket (43) produced from a non-magnetic insulating material which encases the first part (2) of the stator magnetic circuit, connected in leaktight fashion to the part (22) produced from non-magnetic insulating material of the wall of the chamber (20) in order to render the said chamber leaktight.

8. (Amended) The motor as claimed in [any one of claims 1 to 7]claim 1, characterized in that the bearing (16 and 17), which support the rotational shaft (15) of the rotor (14), are linked mechanically to the second part (10) of the stator magnetic circuit by fixing pieces (41 and 42) made of a non-magnetic and insulating material.

(Rev. 11/13/01)

ALTERNATING-CURRENT ELECTRIC MOTOR

The present invention relates to an
alternating-current motor intended to drive a pump or a
5 compressor.

It is particularly suitable for the production
of pumping units which are immersed in a liquid.

It finds its application especially in the oil
industry for pumping fluids at the bottom of production
10 wells for hydrocarbons in liquid, gaseous or multi-
phase form.

BACKGROUND OF THE INVENTION

The electric motors which are most widely used
15 are single-phase or multi-phase asynchronous
alternating-current motors. Their structure is
described in TECHNIQUES DE L'INGENIEUR (ENGINEERING
TECHNOLOGY), a treatise on electrical engineering,
Volume D 3 II Chapter D 3 490 Asynchronous motors -
20 choice and related problems.

According to this document, asynchronous
alternating-current motors essentially include a stator
and a rotor.

The stator consists of coiled windings of
25 conducting wires distributed within a yoke ring forming
a framework and housed within a magnetic circuit
supported by this yoke ring. This magnetic circuit is
formed by stacks of laminations in the form of circular
crowns into which slots are cut parallel to the axis of
30 the yoke ring and in which the conducting wires of the
coiled windings are housed.

Within the crown-shaped magnetic circuit formed
by the stack of laminations is placed the cylindrical-
shaped rotor which includes a rotational shaft
35 supported by a support bearing which is integral with
the yoke ring of the stator.

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The most widespread type of rotor is the squirrel cage rotor, the circuit of which consists of conducting bars regularly spaced between two metal crown rings forming the extremities.

5 This squirrel cage is inserted within a magnetic circuit consisting of disks stacked on the rotational shaft.

10 With this type of motor, since the distances between the windings of the stator are very short, they cannot be supplied with very high voltages and the installation of insulators is an intricate matter.

The same problem is posed for the insulation of the windings with respect to the laminations of the stator circuit.

15 For certain applications, for example for raising water from a water table or hydrocarbons laid down at the bottom of a well, the shaft of the motor is coupled to a pump and the motor-plus-pump assembly is immersed in the fluid to be pumped.

20 In this case, the space between the rotor and the stator is filled with liquid, which further accentuates the problems of electrical insulation set out above.

25 One known solution consists in separating the motor from the pump, but requires the use of a dynamic sealing device mounted on the shaft of the motor. Such sealing devices are delicate and unreliable. They are poorly adapted to the long-term service required for those installations to which access is difficult,
30 expensive or even dangerous.

SUMMARY OF THE INVENTION

The precise object of the present invention is to remedy these drawbacks, and especially to provide an
35 alternating-current electric motor the windings of which can withstand a high voltage and which are easy to produce by virtue of the large distances which

separate the windings from each other and the windings from the stator magnetic circuit.

This electric motor is particularly suitable for forming a submerged electric-pump unit.

5 To this end, the present invention proposes an alternating-current electric motor including a stator magnetic circuit comprising a first part on which electrical windings are mounted and a second, hollow, part within which is mounted a cylindrical rotor
10 equipped with a rotational shaft supported by at least two bearings, which motor is characterized in that it further includes a stator chamber with a leaktight wall, at least a part of which is produced from a non-magnetic insulating material, within which are mounted
15 the first part of the stator magnetic circuit and the electrical windings, the second part of the stator magnetic circuit, the cylindrical rotor and the support bearings lying outside the said chamber and being arranged in such a way that the stator magnetic circuit
20 passes through the wall of the said chamber in the part produced from non-magnetic insulating material.

According to another characteristic of the motor of the invention, with the shaft of the rotor of the said motor being linked mechanically to the shaft
25 of the rotor of a pump, the second part of the stator magnetic circuit, the rotor of the said motor, the support bearings and the rotor of the pump are enclosed in a rotor chamber with a leaktight wall equipped with an inlet and with an outlet for a fluid to be pumped.

30 According to another characteristic of the motor of the invention, the leaktight wall of the stator chamber includes a device for compensating for the pressure difference between the inside and the outside of the said chamber.

35 According to another characteristic of the motor of the invention, the stator electrical windings

include at least one connection for drawing electrical energy.

According to another characteristic of the motor of the invention, the stator magnetic circuit
5 includes a supplementary electrical winding for drawing electrical energy.

According to another characteristic, the motor of the invention further includes an inlet tapping and an outlet tapping which are mounted on the wall of the
10 stator chamber for connecting an external device for cooling a fluid filling the stator chamber.

According to a final characteristic, the motor of the invention further includes a jacket produced from a non-magnetic insulating material which encases
15 the first part of the stator magnetic circuit, connected in leaktight fashion to the part produced from non-magnetic insulating material of the wall of the chamber in order to render the said chamber leaktight.

20

BRIEF DESCRIPTION OF THE DRAWINGS

Other characteristics and advantages of the invention will become apparent on reading the description which follows, given by way of example and
25 by reference to the attached drawings, in which:

- Figure 1 is a view in longitudinal section of an electric motor according to a first embodiment of the invention,

- Figure 2 is a side view of a part of an electric motor according to the first embodiment of the invention,
30

- Figure 3 is a perspective view of a part of an electric motor according to the first embodiment of the invention,

- Figure 4 is a view in longitudinal section of an electric motor according to a second embodiment of the invention,
35

- Figure 5 is a view in longitudinal section of an electric motor according to a third embodiment of the invention.

5 DETAILED DESCRIPTION OF THE INVENTION

Figure 1 represents a view in longitudinal section of a first embodiment of the motor 1 of the invention which includes a laminated stator magnetic circuit which comprises:

- 10 - a first part 2 consisting of three core segments 3, 4 and 5, of which only the segments 3 and 4 are visible in Figure 1, spaced in this instance by 120° and forming a yoke 6 at one of their ends.
- 15 - a second part 10, consisting of three core segments 11, 12 and 13 which extend the three segments 3, 4 and 5, of which only 11 and 12 are visible in Figure 1 and the ends of which form a cylindrical hollow.

On each of the core segments 3, 4 and 5 are
20 mounted electrical windings 7, 8 and 9 of which only 7 and 8 are visible in Figure 1.

The three segments 3, 4 and 5 of the stator magnetic circuit and the electrical windings which they support are placed in a fixed cylindrical casing 19,
25 closed in leaktight fashion at one end by a back plate 21 and, at the opposite end, by a closure plate 22.

This plate 22 is produced from an insulating and non-magnetic material so as not to constitute a short-circuit turn around the stator magnetic circuit,
30 nor a magnetic shunt of the same circuit.

The casing 19 and the plate 22 form a leaktight stator chamber 20. The casing 19 includes a leaktight cable bush for a stator-winding power-supply cable to pass through. The plate 22 includes leaktight bushes 18
35 for the passage respectively of the three cores of the stator magnetic circuit consisting of the segments 3, 4, 5, 11, 12 and 13.

The laminations which constitute the cores of the stator circuit are assembled in leaktight fashion in the region of their passage through the plate 22, for example by means of a thin layer of flexible
5 insulating material arranged between two adjacent laminations.

The yoke 6 of the stator magnetic circuit 2 is held by the support 26.

The casing 19 is also equipped with an inlet
10 tapping 23 and with an outlet tapping 24 for connecting an external device for cooling an insulating fluid filling the stator chamber 20, not represented in Figure 1.

In the hollow situated at the end of the second
15 part 10 of the stator magnetic circuit 2 is mounted a laminated rotor 14 which includes a rotational shaft 15 which rests on the fixed bearings 16 and 17 linked mechanically by fixing pieces 41 and 42 to the second
20 part 10 of the stator circuit so as to ensure centering of the rotor and of the stator. The fixing pieces 41 and 42 are produced from insulating and non-magnetic material so as not to form a short-circuit turn around the segments of stator cores and not to magnetically
short-circuit the stator magnetic circuit.

Figure 2 represents a partial side view of the
25 motor, which shows the relative positions of the stator magnetic circuit comprising the core segments 3, 4, 5 which are linked by the yoke 6, the core segments 11, 12 and 13, the windings 7, 8, 9 mounted on the core
30 segments 3, 4, 5 and the rotor 14 with its shaft 15.

Figure 3 represents a partial view in
perspective of the motor, on which appear the stator
magnetic circuit 2 comprising the core segments 3, 4, 5
linked by the yoke 6, the core segments 11, 12 and 13,
35 the rotor 14 with its shaft 15, the electrical winding 7 mounted on the core segment 3 and the plate 22

equipped with a leaktight bush 18 for the passage of the segment 11.

According to a second embodiment represented diagrammatically in longitudinal section in Figure 4, the motor 1 of the invention has its axis vertical and includes a stator magnetic circuit 2, electrical windings 7, 8, a casing 19, a plate 22 and a rotor 14 as described for the first embodiment and arranged in the same way.

10 According to this second embodiment, the motor 1 further includes:

- a pump impeller 32 equipped with a shaft 27 linked to the end of the shaft 15 of the rotor 14 and equipped at its lower end with an axial abutment 33,

15 - a bellows 40 for compensating for the pressure difference between the two faces of the plate 22,

- an extension 28 of the casing 19 fitted with an end plate 36, which forms a rotor chamber 30 which encloses the second part 10 of the stator magnetic circuit, the rotor 14 and the impeller 32 of the pump,

20 - an electrical connection 38 for drawing electrical energy which passes through the casing 21 via a leaktight cable bush 37.

25 The shafts 15 and 27 are supported by bearings 16, 17 and 31, the bearings 16 and 17 being linked mechanically to the stator magnetic circuit by means of fixing pieces 41 and 42 as in the first embodiment, the bearing 31 and the abutment 33 being integral with the extension 28 of the casing 19.

30 The extension 28 of the casing 19 includes an inlet 34 and an outlet 35 for the liquid put into circulation by the impeller 32 driven by the rotor 14 of the motor.

35 In order to make the motor operate according to this second embodiment, immersed at the very great depth in a liquid, that is to say under very high

static pressure, the stator chamber 20 is filled with a liquid.

By virtue of the bellows 40, the pressures between the stator chamber 20 and the rotor chamber 30 balance out, and thus the problems relating to the pressure difference between these two chambers disappear.

According to a third embodiment represented diagrammatically in longitudinal section in Figure 5, the motor 1 of the invention has its axis vertical and includes a stator magnetic circuit 2, electrical windings 7, 8, a casing 19, a plate 22 and a rotor 14 as described for the first embodiment and arranged in the same way.

According to this third embodiment, the leaktight bushes referenced 18 in Figure 1 are replaced by a jacket referenced 43 in Figure 5.

This jacket 43, produced from an insulating and non-magnetic material, encases the first part 2 of the stator magnetic circuit and is connected in leaktight fashion by a weld 44 to the part 22 of the wall of the stator chamber 20.

By virtue of this jacket, the leaktightness of the stator chamber 20 is ensured and the stator magnetic circuit is under the pressure conditions of the rotor chamber 13, which eliminates the problem of leaktightness of the passage through the part 22 of the wall of the rotor chamber 30 by the laminations of the stator magnetic circuit, and especially leaktightness between the laminations which may be difficult to achieve.

By virtue of the shape of the stator windings and of their mounting on the magnetic core segments, their electrical insulation is not limited by the size of the slots as in conventional motors, and, that being so, they can be supplied with voltages substantially higher than those of conventional motors, which avoids

the use of a transformer in proximity to the motor when the latter is very far from its electrical power-supply source.

5 The electric motor of the invention also exhibits the advantage of including only static sealing devices which do not present the drawbacks of dynamic sealing devices, which confers on it great reliability, indispensable for numerous applications in which the motor is difficult of access, for example at the bottom
10 of an offshore oil production well or in a dangerous area, as is the case in the nuclear industry and certain chemical industries where hazardous products are manufactured.

15 The electrical windings mounted in the leaktight chamber 20 are completely isolated from the surrounding medium and pumped fluid, which renders them insensitive to mechanical and chemical attack relating to the nature of the pumped fluids and of the surrounding medium.

20 The motor of the invention is particularly suitable for pumping hydrocarbons in multi-phase form at the bottom of offshore production wells at very great depth.

WO 01/18942

- 10 -

T/FR00/02410

CLAIMS

1. An alternating-current electric motor including a stator magnetic circuit comprising a first part (2) on which electrical windings (7, 8) are mounted and a second, hollow, part (10) within which is mounted a cylindrical rotor (14) equipped with a rotational shaft (15) supported by at least two bearings (16 and 17), which motor is characterized in that it further includes a stator chamber (20) with a leaktight wall, at least a part of which is produced from a non-magnetic insulating material, within which are mounted the first part (2) of the stator magnetic circuit and the electrical windings (7, 8), the second part (10) of the stator magnetic circuit, the cylindrical rotor (14) and the support bearings (16 and 17) lying outside the said chamber and being arranged in such a way that the stator magnetic circuit passes through the wall of the said chamber in the part produced from non-magnetic insulating material.

2. The motor as claimed in claim 1, characterized in that, with the shaft (15) of the rotor (14) of the said motor being linked mechanically to the shaft (27) of the rotor (32) of a pump, the second part (10) of the stator magnetic circuit, the rotor (14) of the said motor, the support bearings (16 and 17) and the rotor (32) of the pump are enclosed in a rotor chamber (30) with a leaktight wall equipped with an inlet (34) and with an outlet (35) for a fluid to be pumped.

3. The motor as claimed in either of claims 1 and 2, characterized in that the leaktight wall of the stator chamber (20) includes a device (40) for compensating for the pressure difference between the inside and the outside of the said chamber.

4. The motor as claimed in one of claims 1 to 3,
characterized in that the stator electrical windings
(7, 8) include at least one connection (38) for drawing
5 electrical energy.

5. The motor as claimed in one of claims 1 to 3,
characterized in that the stator magnetic circuit
includes a supplementary electrical winding for drawing
10 electrical energy.

6. The motor as claimed in one of claims 1 to 5,
characterized in that it further includes an inlet
tapping (24) and an outlet tapping (25) which are
15 mounted on the wall of the stator chamber (20) for
connecting an external device for cooling a fluid
filling the stator chamber (20).

7. The motor as claimed in one of claims 1 to 6,
20 characterized in that it further includes a jacket (43)
produced from a non-magnetic insulating material which
encases the first part (2) of the stator magnetic
circuit, connected in leaktight fashion to the part
(22) produced from non-magnetic insulating material of
25 the wall of the chamber (20) in order to render the
said chamber leaktight.

(12) DEMANDE INTERNATIONALE PUBLIÉE EN VERTU DU TRAITÉ DE COOPÉRATION
EN MATIÈRE DE BREVETS (PCT)(19) Organisation Mondiale de la Propriété
Intellectuelle
Bureau international(43) Date de la publication internationale
15 mars 2001 (15.03.2001)

PCT

(10) Numéro de publication internationale
WO 01/18942 A1(51) Classification internationale des brevets: H02K 5/12,
9/197, 7/14, 11/00, 17/02, F04D 13/06(72) Inventeur; et
(75) Inventeur/Déposant (pour US seulement): PROUVOST,
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(22) Date de dépôt international: 31 août 2000 (31.08.2000)

(81) États désignés (national): NO, US.

(25) Langue de dépôt: français

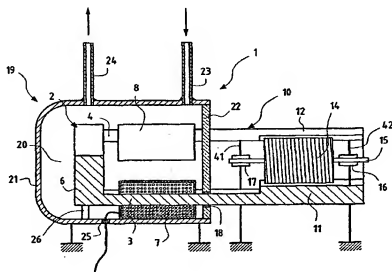
(84) États désignés (régional): brevet européen (AT, BE, CH,
CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT,
SE).

(26) Langue de publication: français

(30) Données relatives à la priorité:
99/11076 3 septembre 1999 (03.09.1999) FRPubliée:
— Avec rapport de recherche internationale.(71) Déposant (pour tous les États désignés sauf US): ELF
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(FR).En ce qui concerne les codes à deux lettres et autres abréviations,
se référer aux "Notes explicatives relatives aux codes et
abréviations" figurant au début de chaque numéro ordinaire de
la Gazette du PCT.

(54) Title: ALTERNATING CURRENT ELECTRIC MOTOR

(54) Titre: MOTEUR ELECTRIQUE A COURANT ALTERNATIF



(57) Abstract: The invention concerns an AC electric motor (1) comprising a stator magnetic circuit including a first part (2) whereon are mounted electrical windings (7 and 8) and a second recessed part (10) wherein is mounted a rotor (14). The invention is characterised in that the first part (2) of the stator magnetic circuit and the electrical windings (7 and 8) are mounted inside a stator chamber (20) with sealed wall, the second part (10) of the stator magnetic circuit, the cylindrical rotor (14) being located outside said chamber. The invention is applicable in the oil industry for pumping fluids in bottom holes producing hydrocarbons in liquid, gas or polyphase form and in chemical and nuclear industries for pumping dangerous or chemically harmful fluids.

[Suite sur la page suivante]

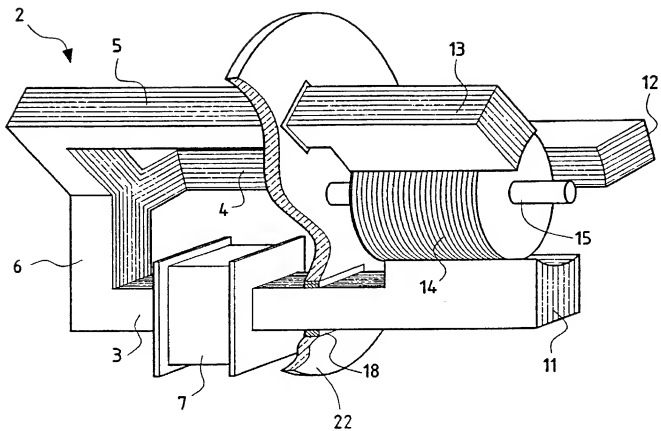
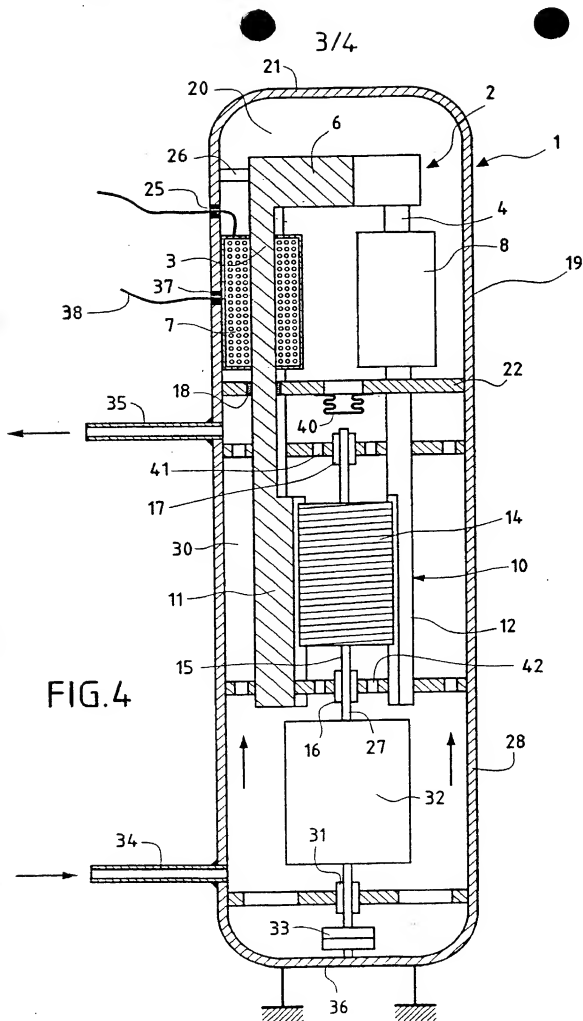
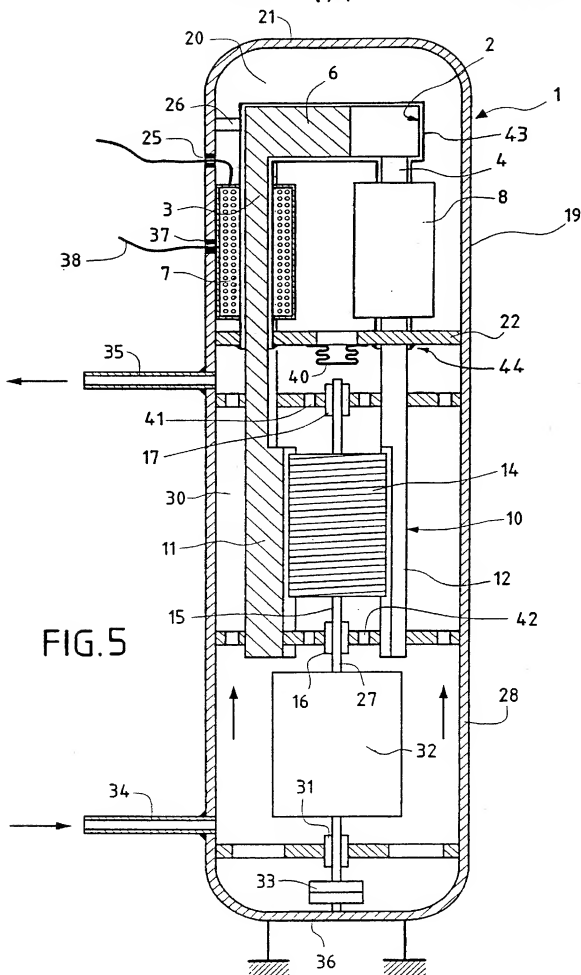


FIG.3



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BIRCH, STEWART, KOLASCH & BIRCH, LLP

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As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title:

ALTERNATING-CURRENT ELECTRIC MOTORFill in Appropriate
Information -
For Use Without
Specification
Attached:

the specification of which is attached hereto. If not attached hereto,

the specification was filed on March 1, 2002United States Application Number 10/069,887

and amended on _____

the specification was filed on August 31, 2001International Application Number PCT/FR00/02410

amended on _____

(if applicable) and/or

as PCT

and was

(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows:

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Prior Foreign Application(s)

Priority Claimed

Insert Priority
Information:
(if appropriate)99 11 076
(Number)France
(Country)September 3, 1999
(Month/Day/Year Filed)☒ Yes ☐ No

(Number)

(Country)

(Month/Day/Year Filed)

☐ Yes ☐ No

(Number)

(Country)

(Month/Day/Year Filed)

☐ Yes ☐ No

(Number)

(Country)

(Month/Day/Year Filed)

☐ Yes ☐ No

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(if any)

(Application Number)

(Filing Date)

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Application Number

Date of Filing (Month/Day/Year)

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Insert Prior U.S.
Application(s):
(if any)

(Application Number)

(Filing Date)

(Status - patented, pending, abandoned)

(Application Number)

(Filing Date)

(Status - patented, pending, abandoned)

I hereby appoint the practitioners at CUSTOMER NO. 2292 as my attorneys or agents to prosecute this application and/or an international application based on this application and to transact all business in the United States Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the practitioners, unless the inventor(s) or assignee provides said practitioners with a written notice to the contrary:

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Inventor's Signature
Inventor's Address

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Residence (City, State & Country)

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Mailing Address (Complete Street Address including City, State & Country)

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Inventor, if any:
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Full Name of Third
Inventor, if any:
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Full Name of Fourth
Inventor, if any:
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GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP
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GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
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*DATE OF SIGNATURE